WEATHER OF THE ATLANTIC AND PACIFIC OCEANS

[The Marine Division, W. F. McDonald in charge]

NORTH ATLANTIC OCEAN

By W. F. McDONALD

Atmospheric pressure.—Average pressures during September 1933 were above normal over the northeastern Atlantic and western Europe. The largest excess was a quarter of an inch, in the region of the Shetlands. High pressure areas were better developed and more persistent from the Azores northeastward than in other regions of the North Atlantic. The highest barometer readings of the month were observed southeast of Ireland between the 6th and 8th when a number of ships recorded 30.40 to 30.60 inches.

Considering the month as a whole, however, the normal Atlantic HIGH was characterized by weakness and irregularity, especially between the 3d and 10th, and from the 22d until the close. When well established, the center was at times shifted unusually far south of the Azores, and on several dates between the 9th and 17th the barometer was up to 30.00 inches in latitudes as low as 5° N., which is an abnormal height for that region of the Atlantic.

Average pressures were 0.10 to 0.20 inch below normal along the American coast north of Cape Hatteras, and slightly deficient over the remainder of the ocean west of a line from the Madeiras to southeast Greenland.

TABLE 1.—*Averages, departures, and extremes of atmospheric pressure (sea level) at selected stations for the North Atlantic Ocean and its shores, September 1933*

Stations	Average pressure	Departure	Highest	Date	Lowest	Date
	Inches	*Inch*	*Inches*		*Inches*	
Julianehaab, Greenland	29.59		30.16	10	29.06	17
Reykjavik, Iceland	29.80	+0.08	30.32	13	29.20	16
Lerwick, Shetland Islands	30.10	+.26	30.54	7	29.52	18
Valencia, Ireland	30.06	+.07	30.42	7	29.48	23
Lisbon, Portugal	30.06	+.04	30.39	21	29.79	14
Madeira	30.05	+.03	30.36	6	29.83	16
Horta, Azores	30.14	−.03	30.30	13	29.94	16
Belle Isle, Newfoundland	29.75	−.15	30.24	25	28.78	11
Halifax, Nova Scotia	29.89	−.16	30.40	16	28.90	18
Nantucket	29.90	−.18	30.28	15	29.16	17
Hatteras	29.93	−.13	30.20	3	28.26	16
Bermuda	30.04	−.04	30.18	3,4	29.76	10
Turks Island	29.93	−.05	30.02	8,18	29.80	2,30
Key West	29.90	−.04	30.07	8	29.61	1
New Orleans	29.94	−.04	30.11	9	29.80	11
Cape Gracias, Nicaragua	29.79	−.04	29.86	7,8	29.68	30

NOTE.—All data based on a.m. observations only, with departures compiled from best available normals related to time of observations, except Hatteras, Key West, Nantucket, and New Orleans, which are 24-hour corrected means.

Cyclones and gales.—Extratropical low-pressure areas were slow moving, as a rule, and persistently dominated the region from Hudson Bay to mid-Atlantic as far as the thirtieth meridian but seldom moved on eastward into the Greenland Sea. Several lows, however, moved from the Atlantic into western Europe.

Gales infrequently attended extratropical cyclones along the higher latitudes, and were reported at scattered places north of the fortieth parallel on less than one third of the days of the month. Between the 15th and 22d, however, gales and hurricane winds were experienced by many ships in connection with a tropical disturbance that had moved into latitudes above 40°, first along the American coast but finally in the region southwest of Iceland as the hurricane center merged with other low-pressure systems of the high latitudes and traveled northeastward across the Atlantic. (See table of gales.) The whole track for this storm preceding September 22 is shown on chart XI.

Several cyclones developed over the Atlantic between the Azores and the American coast, but only one produced storm conditions deserving of mention. That disturbance began about the 23d southwest of the Azores, and moved steadily northward, attended by whole gales over a narrow track that started near latitude 30° on the 24th and extended almost to latitude 55° by the 27th. The origin in this case appears to have been definitely extratropical, but the storm exhibited some of the characteristics of a small tropical cyclone in its type of movement and the limited area of strong winds.

South of latitude 40° and west of the sixty-fifth meridian, the month of September was productive of an extraordinary number of ships' gale reports, all resulting from the activity of tropical cyclones.

Tropical cyclones.—Seven cyclonic disturbances were recognized in the West Indian region in September 1933, as discussed elsewhere in this issue, but only five of these produced gale winds reported by ships.

A hurricane of major intensity was in progress westward along the north coast of Cuba at the opening of the month. The American steamers *La Perla* and *Betterton* experienced hurricane winds on the afternoon of September 1 in the Florida Straits, and on the 2d the *Harvester* had force 12 and a barometer of 27.99 inches near 25° N., 86° W. After that date, winds of force 10 to 11 were the highest reported by ships in the Gulf as the storm moved steadily westward and passed inland near Brownsville on the night of September 4. Damage to maritime interests by this hurricane was mostly confined to the north coast of Cuba and the southern coast of Texas.

While this hurricane was in full progress over the Florida Straits, another was forming some distance north of Puerto Rico. About midnight of September 1 its center, accompanied by storm winds (force 11) shifting from west-northwest to south, passed near the American tanker *Gulfwing*, at 22° N., 69° W., where the barometer fell to 28.89 inches. From that date until the 6th, vessels experienced strong gales and storm winds associated with the further movement of this disturbance over the northern Bahamas to Florida and Georgia, but so far no ship has reported winds of hurricane force, in that connection.

The weather chart for September 4 (chart VIII) shows the first of these storms approaching Brownsville, with the second over Florida.

On the afternoon of September 11, the major hurricane of the month was definitely identified with its center fully developed near 23° N., 62° W., where the French steamship *Washington* passed through the left semicircle. The barometer fell to 27.96 inches, attended by winds of force 11 shifting from north-northwest to southwest. The vortex was of relatively small diameter at the time, for at the same hour when the *Washington* experienced the lowest pressure the British steamship *Tuscarora*, then about 50 miles away, recorded a barometer reading of 29.53 inches.

No ship has reported coming in close contact with the center of this hurricane again until the 15th, although winds of force 9 to 11 were recorded by several ships at distances of 75 to 100 miles on either side of the storm track. On the morning of the 15th the American ship *Orizaba* experienced a southeast hurricane, barometer 28.59, near 34° N., 74° W. Thereafter the marine records are replete with ships' observations of pressures between 28.24 and 29.00 inches, and winds of hurricane

violence, as the storm center moved northward past Cape Hatteras and thence northeastward to Nova Scotia. The details of the more intense phases of this movement will be found in the selections from the numerous ships' reports carried in the accompanying table of gales and storms.

The situation over the Atlantic on September 15, when this hurricane fully covered the coastwise steamer lanes, is shown on chart IX; and its stage 3 days later on chart X. The complete track of the storm, after it had passed on toward Iceland, will be found on chart XI. Notwithstanding its great size and intensity, and the course northward over crowded shipping lanes, there was remarkably little maritime loss apart from the damage to coastal works and small craft.

While this major storm was in progress two other intense disturbances arose in the western Caribbean Sea, at dates less than 10 days apart, which followed remarkably similar tracks northwestward across Yucatan and the Gulf of Campeche. Each struck Tampico, Mexico, as a disastrous hurricane. The first of these storms produced gales of force 9 in the Gulf of Honduras on the 12th and 13th, and whole gales in the southwestern Gulf of Mexico, on the 14th and 15th, but so far no ship has reported winds of hurricane force.

The second of the pair was of hurricane intensity over a very small area when the center was first definitely located by the American liner *Virginia*, which passed through the vortex (pressure 27.40 inches) at 18°30′ N., 83° W., on September 20. This experience of the *Virginia* is fully reported in another place in this issue. On the following day the American steamer *Tivives* also experienced hurricane winds in this storm as she was steering northward into the Yucatan Channel. Again, however, the center moved through the southwestern Gulf without seriously involving any of the small number of vessels that ply those waters, and no winds higher than force 10 have been reported from that region prior to September 24, when the center moved in over Tampico.

Storm damage in the city of Tampico was very great, both in property and in human lives, but no major loss to shipping has come to notice. The German steamer *Adria* reports that the two storms caused great changes in the entrance to Tampico harbor by the action of storm tides and currents, which shifted the bar.

Chart IX shows the first of these two storms over Tampico. The second is shown over Yucatan on chart XI.

Fog.—Fogginess was less prevalent than usual near the European coast, and above average frequency west of the 20th meridian. The normal seasonal decrease did not occur in the region of the Grand Banks and Gulf of Maine, where fogs were encountered on 10 to 14 days of the month, nor in the surrounding regions from Cape Hatteras to mid-Atlantic north of the 40th parallel, where fogginess was reported on 6 to 9 days in many 5-degree squares.

Fog occurred September 14 on the 25th parallel south of the Canary Islands; this is a most unusual record.

OCEAN GALES AND STORMS, SEPTEMBER 1933

Vessel	Voyage		Position at time of lowest barometer		Gale began	Time of lowest barometer	Gale ended	Lowest barometer	Direction of wind when gale began	Direction and force of wind at time of lowest barometer	Direction of wind when gale ended	Direction and highest force of wind	Shifts of wind near time of lowest barometer
	From—	To—	Latitude	Longitude									
NORTH ATLANTIC OCEAN			° ′	° ′				*Inches*					
La Perla, Am.S.S.	Baltimore	Puerto Barrios.	24 20 N	80 40 W	Sept. 1	5p., Sept 1.	Sept. 2	29.51	ENE.	ESE, 12	SE.	ESE, 12	None.
Cefalu, Hond.S.S.	Habana	Cristobal	23 09 N	82 21 W	do	5p., 1	Sept. 1	29.06	NNE.	W, 10	SSE.	W, 10	WNW-SSW.
Betterton, Am.S.S.	Houston	New York	24 20 N	82 40 W	do	6p., 1	Sept. 2	29.41	NE.	NE, 12	ESE.	NE, 12	NE-E.
Gulfwing, Am.M.S.	Las Piedras, Venezuela.	Philadelphia	21 52 N	68 59 W	do	11p., 1	do	28.89	N.	W, 11	SE.	W, 11	WNW-W-S.
William G. Warden, Am.S.S.	Port Aransas	Baltimore	24 45 N	83 45 W	do	1a., 2	do	29.37	NE.	E, 11	ESE.	E, 11	E.
Dilworth, Am.S.S.	New York	Colon	25 28 N	74 00 W	Sept. 2	1p., 2	Sept. 3	29.46	E.	NE, 10	SE.	do	NE-E.
Harvester, Am.S.S.	Houston	New York	25 00 N	86 00 W	do	2p., 2	do	27.99	NE.	NE, 12	do	NE, 12	NE-E-SE.
Pacific Sun, Am.M.S.	Beaumont	Marcus Hook	25 59 N	85 38 W	do	4p., 2	Sept. 2	29.71	do	ENE, 10	ESE.	ENE, 11	NE-ENE-E.
Bremen, Ger.S.S.	New York	Bremerhaven	41 47 N	52 34 W	Sept. 1	8p., 2	do	29.79	ESE.	NNE, 10	do	NNE, 12	SSE-N-ESE.
Trimountain, Am.S.S.	Philadelphia	Cristobal	25 00 N	73 30 W	Sept. 2	8p., 2	Sept. 3	29.69	ENE.	Var., 11	SSE.	Var., 11	ENE-SSE.
Aldecoa, Span.S.S.	Lisbon	New York	40 32 N	51 48 W	do	Mdt., 2	do	29.83	S.	SSW, 10	NNW.	SSW, 10	S-WSW-NW.
El Mundo, Am.S.S.	Galveston	do	27 40 N	91 00 W	Sept. 3	1p., 3	do	29.59	N.	NE, 9	ESE.	NE, 9	NE-E.
R. J. Hanna, Am.S.S.	Houston	Marcus Hook	25 30 N	93 00 W	do	8p., 3	Sept. 4	29.20	do	W, 11	SSE.	WSW, 11	NW-W-WSW.
Berlin, Ger.S.S.	English Channel.	New York	48 47 N	28 10 W	Sept. 4	7p., 4	Sept. 5	29.68	SSE.	S, —	NW.	NW, 9	S-W-NW.
Hazelwood, Br.S.S.	Swansea	Montreal	53 39 N	24 06 W	do	2a., 5	Sept. 7	29.17	S.	S, 6	S.	WNW, 10	S-WSW-WNW.
Gonzenheim, Ger.S.S.	Botwood	Antwerp	50 57 N	48 45 W	do	4a., 6	Sept. 6	29.40	SW.	SSW, 8	W.	SSW, 9	
Solana, Am.S.S.	Boston	New Orleans	31 25 N	80 06 W	Sept. 5	4a., 6	do	29.63	SE.	S, 9	S.	S, 9	SE-SSE-S.
Quistconck, Am.S.S.	Hamburg	Norfolk	42 24 N	55 54 W	Sept. 10	Mdt., 10	Sept. 11	29.21	SW.	SW, 8	W.	SW, 10	None.
Hazelwood, Br.S.S.	Swansea	Montreal	52 25 N	52 48 W	Sept. 11	6p., 11	Sept. 13	29.07	SSE.	ESE, 6	WSW.	S, 9	S-ESE-WSW.
Washington, Fr.M.S.	Cristobal	Havre	23 15 N	61 40 W	Sept. 10	8p., 11	Sept. 12	27.96	NE.	NNW, 11	SSE.	SW, 11	NNW-SW.
Tuscarora, Br.S.S.	Aruba	Liverpool	22 52 N	61 20 W	Sept. 11	8p., 11	do	29.53	NNW.	WSW, 9	SE.	S, 10	W-WSW-SSW.
Zacapa, Am.S.S.	Tela, Honduras.	New Orleans	18 05 N	87 06 W	Sept. 12	4a., 12	Sept. 13	29.39	NW.	NW, 6	do	SE, 9	
President Hayes, Am.S.S.	Habana	Cristobal	20 15 N	84 18 W	do	4p., 12	do	29.70	NE.	ESE, 8	do	ESE, 9	SSE-E-SE.
Sinaloa, Hond.S.S.	Mobile	Bluefield	[1]18 34 N	86 58 W	do	2a., 13	do	29.43	E.	ESE, 9	do	SE, 9	ESE-SE.
Panuco, Am.S.S.	New York	Progreso	21 30 N	89 30 W	Sept. 13	5p., 13	Sept. 14	29.40	NE.	ENE, 7	do	ESE, 8	ENE-ESE.
Gulfstar, Am.S.S.	Las Piedras, Venezuela.	New York	28 54 N	69 50 W	do	1a., 14	do	29.61	do	SE, 10	SSE.	SE, 10	ESE-SE.
Spondilus, Br.M.S.	Tuxpam, Mexico.	Rotterdam	22 26 N	93 37 W	do	4a., 14	Sept. 15	29.48	do	E, 10	SE.	E, 10	ENE-E.
Thomas H. Wheeler, Am.S.S.	Portland, Maine.	Baytown	30 50 N	76 40 W	Sept. 14	7p., 14	do	29.52	do	NW, 9	W.	NW, 9	NW-W.
Anderson, Nor. S.S.	Tuxpam	New Orleans	[1]23 12 N	95 48 W	do	Mdt., 14	do	29.12	NW.	E, 6	ESE.	E, 10	NNE-E-SE.
Orizaba, Am.S.S.	New York	Habana	33 30 N	74 00 W	do	8a., 15	Sept. 16	28.59	ENE.	SE, 11	SW.	SE, 12	ESE-SE.
El Oceano, Am.S.S.	do	Galveston	34 00 N	74 30 W	Sept. 15	Mdt., 15	do	28.24	do	S, 5	WSW.	ENE, 11	SSW.
Shenandoah, Am.S.S.	Norfolk	Port Arthur	36 35 N	75 00 W	do	2p., 16	Sept. 17	28.43	E.	ENE, 12	WNW.	NW, 12	ENE-NNW.
Gulfcrest, Am.M.S.	New York	Cristobal	37 40 N	73 40 W	Sept. 16	3p., 16	do	28.65	NE.	NE, 10	W.	ENE, 10	ENE-N-NW.
Veragua, Am.S.S.	do	Habana	36 48 N	74 54 W	do	4p., 16	Sept. 16	28.65	ESE.	N, 12	NW.	N, 12	NNE-N-NW.
Gulfhawk, Am.M.S.	Philadelphia	Las Piedras	36 48 N	74 38 W	do	4p., 16	do	28.66	E.	E, 12	WNW.	E, 12	E-N-NW.
Gulf of Mexico, Am.S.S.	New York	Port Arthur	36 35 N	74 41 W	Sept. 15	6p., 16	do	28.48	SE.	NNW, 10	NW.	ESE, 11	ENE - NNW-NW.
Nitro, U.S.N.	Hampton Roads.	Habana	36 14 N	73 12 W	do	7p., 16	Sept. 17	29.24	ENE.	SSE, 11	W.	SSE, 12	SSE-S.
Walter Jennings, Am.S.S.	New York	Baytown	[1]37 12 N	74 18 W	Sept. 16	9p., 16	do	28.90	E.	NE, 12	WNW.	NNE, 12	NE - NNE-NNW.

[1] Position approximate.